

PATENT COOPERATION TREATY

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INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY (Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

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Applicant's or agent's file reference 17033-PCT	FOR FURTHER ACTION		See Form PCT/IPEA/416
International application No. PCT/CA2004/001755	International filing date (day/month/year) 29 September 2004 (29-09-2004)	Priority date (day/month/year) 02 October 2003 (02-10-2003)	
International Patent Classification (IPC) or national classification and IPC IPC:H01L 51/30 (2006.01), C08F 12/32 (2006.01), C08J 5/20 (2006.01), C08F 26/12 (2006.01) H01L 51/54 (2006.01), H01L 51/46 (2006.01)			
Applicant NATIONAL RESEARCH COUNCIL OF CANADA ET AL			
<p>1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 4 sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p>a. <input checked="" type="checkbox"/> (sent to the applicant and to the International Bureau) a total of 3 sheets, as follows:</p> <p style="padding-left: 40px;"><input checked="" type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).</p> <p style="padding-left: 40px;"><input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. 1 and the Supplemental Box.</p> <p>b. <input type="checkbox"/> (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in electronic form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</p>			
<p>4. This report contains indications relating to the following items:</p> <p><input checked="" type="checkbox"/> Box No. I Basis of the report</p> <p><input type="checkbox"/> Box No. II Priority</p> <p><input type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</p> <p><input type="checkbox"/> Box No. IV Lack of unity of invention</p> <p><input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability, citations and explanations supporting such statement</p> <p><input type="checkbox"/> Box No. VI Certain documents cited</p> <p><input type="checkbox"/> Box No. VII Certain defects in the international application</p> <p><input checked="" type="checkbox"/> Box No. VIII Certain observations on the international application</p>			
Date of submission of the demand 27 April 2005 (27-04-2005)		Date of completion of this report 8 February 2006 (08-02-2006)	
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International application No.
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Box No. I Basis of the report

1. With regard to the language, this report is based on:
 - ☒ the international application in the language in which it was filed
 - ☐ a translation of the international application into _____, which is the language of a translation furnished for the purposes of:
 - ☐ international search (Rules 12.3(a) and 23.1(b))
 - ☐ publication of the international application (Rule 12.4(a))
 - ☐ international preliminary examination (Rules 55.2(a) and/or 55.3(a))
2. With regard to the elements of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:
 - ☐ the international application as originally filed/furnished
 - ☒ the description:
 - ☒ pages 1-27 as originally filed/furnished
 - ☐ pages* received by this Authority on _____
 - ☐ pages* received by this Authority on _____
 - ☒ the claims:
 - ☐ pages as originally filed/furnished
 - ☐ pages* as amended (together with any statement) under Article 19
 - ☒ pages* 28-30 received by this Authority on 2005.04.2005 (27 April 2005)
 - ☐ pages* received by this Authority on _____
 - ☒ the drawings:
 - ☒ pages 1/12 to 12/12 as originally filed/furnished
 - ☐ pages* received by this Authority on _____
 - ☐ pages* received by this Authority on _____
 - ☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing.
3. ☐ The amendments have resulted in the cancellation of:
 - ☐ the description, pages
 - ☐ the claims, Nos.
 - ☐ the drawings, sheets/figs
 - ☐ the sequence listing *(specify)*:
 - ☐ any table(s) related to sequence listing *(specify)*:
4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
 - ☐ the description, pages
 - ☐ the claims, Nos.
 - ☐ the drawings, sheets/figs
 - ☐ the sequence listing *(specify)*:
 - ☐ any table(s) related to sequence listing *(specify)*:

* If item 4 applies, some or all of those sheets may be marked "superseded."

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**1. Statement**

Novelty (N)	Claims	<u>1-12</u>	YES
	Claims	<u>None</u>	NO
Inventive step (IS)	Claims	<u>None</u>	YES
	Claims	<u>1-12</u>	NO
Industrial applicability (IA)	Claims	<u>1-12</u>	YES
	Claims	<u>None</u>	NO

2. Citations and explanations (Rule 70.7)

D1: US A1 2003/0008172 (LECLERC, M. et al.)
D2: US A 6, 11, 063 (JONG-WOOK PARK, S. et al.)
D3: JP A 2002-09 3582 (ZENG, S. et al.)
D4: Barbec, C. J. et al. "Plastic Solar Cells", Adv. Func. Mater. 2001 FeB. 11(1): 15-26

Novelty (N)

D1 teaches the use of carboazulene derivatives (cf. page 2, paragraphs 14-16) as organic light emitting diodes (OLEDs) for improving the light emitting properties (cf. abstract). Claims 1-12 are directed to the use of carbazulenevinylene derivative(s) in either Organic Field Effect Transistors (OFETs) or Organic Photovoltaic Cell (OPC). Therefore, claims 1-12 meet the requirement with respect to novelty (Article 33(2) PCT).

Inventive Step (IS)

D2 describes a photoluminescent polymeric material for use in a display device comprising a 3, 6-carbazulenevinylene derivative in which the nitrogen of the aromatic amine is in conjugation with the double bond (cf. column 2, lines 45-55). As a result of extended conjugation, the polymer is capable of displaying various colours from blue to green (cf. column 1, lines 56-58). The photoluminescence (PL) spectrum of the polymer is shown in Fig. 2. The use of 3, 6-carbazulenevinylene derivative in the devices provides advantage of (a) low driving voltage, (b) short response time, and (c) can display various colours over a range from blue to green.

D3 describes an electric field light emitting device having many kinds of energy band gaps and wide colouring range (cf. abstract) comprising a 3, 6-carbazulenevinylene derivative as an active material.

D4 reviews the use of conjugate-polymer-based polymers (cf. page 25 under the heading "outlook and strategies") in devices such as photoconductors and photovoltaic cells (cf. abstract). The photophysics behind such devices being photoinduced charge transfer from donor-type semiconducting conjugated polymer to acceptor type conjugated polymers or acceptor molecules for example fullerenes.

It would be obvious for a person skilled in the art, in the light of the description of D2-D4, to prepare the polymer simply by repositioning the substituents in the monomer/repeating unit for the same use e.g. photovoltaic cell. The very idea of introducing the double bond in carbazulene to prepare the carbazulenevinylene derivative is to extend the conjugation so that the polymer prepared from these derivatives display colours. The use of either 3, 6 or 2,7-carbazulenevinylene derivative in display device does not change the basic optical function of the active material, that is, providing extended conjugation for displaying colours. Functionally these two derivatives are substantially similar (compare Figure 2, photoluminescence (PL) spectrum of polymers, of D2 vs. Figure 13, photoluminescence (PL) spectrum of polymers of instant application). Both these spectra show the display of colours indicating that these compounds are functionally the same. This suggests that repositing of the substituents does not in any way impact greatly on the function of these compounds. Also, the photophysics behind conjugated polymers does not substantially change by simply repositioning the substituents. It is rather the conjugation that is more important (cf. page 15 of D4 under the subheading "Conjugated Polymers as Photoexcited Donors"). This further suggests that functionally 3, 6 and 2,7-carbazulenevinylene (oligomers and polymers) are functionally the same. The invention deals with the use of functionally known polymers for obvious use either as OFETs or OPCs. Therefore, inventive step cannot be acknowledge for the claims 1-12 (Article 33(3) PCT).

Industrial Applicability (IA)

The claimed subject matter of claims 1-12 is considered to be industrially applicable and thus fulfill the requirements of Article 33(4) PCT.

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Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

Page 1, line 4, and page 8, lines 5, 14 contains references to unpublished, previously filed applications. Such references do not form part of the disclosure unless applications referred to is made available to the public on or before the publication date of the international application (Article 5 PCT).

The expressions such as "any type of monomer" and "any type of end-cap groups" on page 5, lines 18-19 would lead the subject matter of the disclosure beyond its scope and is therefore objectionable under Article 5 PCT.